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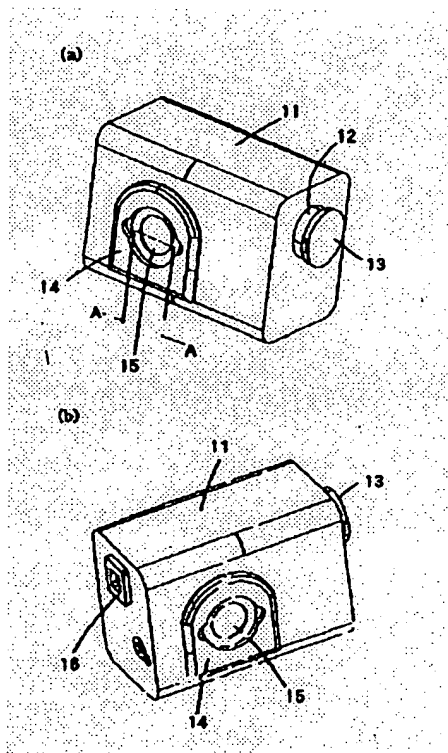
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- (54) [Title of Invention] Storage Mechanism for the Lens Cover of an Imaging Device

(57) [Abstract]

**[Subject]** A lens cover storage mechanism is installed on the grip part in order to prevent loss of the lens cover and to prevent the lens cover from interfering with the imaging process. Moreover, the bulge of the grip part is effectively utilized.

**[Solution Means]** They include the imaging device main body (11), the lens mirror cylinder (12), the lens cover (13), the grip part (14), the lens cover holding part (15), the viewfinder (16) and the grip belt (17). In addition, a recording device is incorporated inside the imaging device main body (11). When carrying the imaging device, the lens cover (13) is attached to the front of the lens mirror cylinder to protect the lens from being damaged or from dust.



## **[Scope of Patent Claims]**

[Claim 1] Imaging device equipped with a lens cover storage mechanism, characterized in that, in the imaging device comprising a lens for imaging a subject to be imaged, a recording device for recording into a recording medium the input signal input from the lens, a display device for displaying the said input signal, a lens cover that can be attached to or detached from the said lens and a grip part including a bulge for improving a grip, a lens cover storage part for storing the said lens cover is installed on the said grip part so that the said lens cover storage part can store the said lens cover during the imaging process and the lens storage part can be utilized at least as one part of the grip part.

[Claim 2] Imaging device equipped with a lens cover storage mechanism, characterized in that, in the imaging device in accordance with claim 1, when it is necessary to store the said lens cover in the said lens cover storage part, it can be stored from the wrist direction while holding the said imaging device.

[Claim 3] Imaging device equipped with a lens cover storage mechanism, characterized in that, in the imaging device in accordance with claim 1, the projection of a grip belt attached to the said imaging device main body is shaped in such a way that it covers up the said lens cover storage part to make the said lens cover storage part not noticeable.

## **[Detailed Description of the Invention]**

[0001]

**[Field of Industrial Application]** The present invention pertains to an imaging device with a lens cover that can be attached or detached. More specifically, the present invention pertains to an imaging device in which the imaging device main body is equipped with a lens cover storage part.

[0002]

**[Prior Art]** In an imaging device, a lens cover is installed in order to protect the lens from being damaged or from dust. Such a lens cover is in two formats. In the cap format, the lens cover can be attached to or detached freely from the lens mirror cylinder of the imaging lens. In the other format, the lens cover is installed in front of the lens part in such a way that it can be opened or closed and is interlocked with a switch of the imaging device so that it can be opened or closed automatically. In the latter case involving automatic opening and closing of the lens cover, the opening-closing mechanism is complex, making downsizing of the imaging device difficult and also causing an increase in the cost. Therefore, the former case involving the cap format is more frequently used.

[0003] In the case of the prior-art lens cover of the cap format, the lens cover is removed during the imaging process and usually is stored by hanging it on the grip belt or is carried separately.

[0004] In some imaging devices, the grip part is allowed to bulge to increase the area of contact with the palm to improve the grip. However, not many of such imaging devices effectively utilize this bulging part.

[0005]

**[Problems to the Solved by the Invention]** When the detached lens cover is hung onto the grip belt as mentioned above, the lens cover may fall off easily because it is attached to the grip belt in a simplified fashion and may also interfere with the imaging process. On the other hand, when the lens cover is carried separately during the imaging process, frequently it may be lost while walking.

[0006] Also, the grip part of some imaging devices forms a bulge in order to improve the grip and not many of such imaging devices effectively utilize such a bulged part.

[0007] The object of the present invention is to solve the problem mentioned above by installing a lens cover storage mechanism in the grip part to avoid loss of the lens cover and avoid interference with the imaging process by the lens cover. In this way, the bulge in the grip part can be effectively utilized.

[0008]

**[Means for Solving the Problems]** In order to achieve the object mentioned above, the imaging device in accordance with claim 1 of the invention according to the present application is so constructed that it is characterized in that, in the imaging device comprising a lens for imaging a subject to be imaged, a recording device for recording into a recording medium the input signal input from the lens, a display device for displaying the said input signal, a lens cover that can be attached to or detached from the said lens and a grip part including a bulge for improving the grip, a lens cover storage part for storing the said lens cover is installed on the said grip part so that the said lens cover storage part can store the said lens cover during the imaging process and the lens storage part can be utilized at least as one part of the grip part. In the invention in accordance with claim 2, when it is necessary to store the said lens cover in the said lens cover storage part of the imaging device in accordance with claim 1, the lens cover can be stored from the wrist direction while holding the said imaging device. In the invention in accordance with claim 3, the imaging device in accordance with claim 1 has a structure in which the projection of a grip belt attached to the said imaging device main body is shaped in such a way that it covers up the said lens cover storage part, making the said lens cover storage part not noticeable.

[0009] With the structure mentioned above, the lens cover storage part can be made not noticeable while carrying the imaging device.

[0010]

**[Embodiments of Implementation of the Invention] (Embodiment of First Implementation)** Figure 1-Figure 5 show the embodiment of first implementation of the present invention. Figure 1 shows the embodiment of the imaging device being carried, in which the lens cover is attached to the front of the lens mirror cylinder. Figure 2 is an enlarged figure of the lens cover. Figure 3 is an A-A cross-sectional figure of the lens cover storage part. Figure 4 shows the state in which the lens cover is stored in the lens cover storage part formed at the grip part of the imaging device main body. In Figure 5, a grip belt is installed on the imaging device main body.

[0011] As can be seen from Figure 1-Figure 5, the simplified structure of the imaging device equipped with the lens cover storage mechanism of the present invention comprises the imaging device main body (11), the lens mirror cylinder (12), the lens cover (13), the grip part (14), the lens cover holding part (15), the viewfinder part (16) and the grip belt (17). A recording device is incorporated into the imaging device main body (11). As shown in Figure 1, when the imaging device is being carried, the lens cover (13) is attached to the front of the lens mirror cylinder (12) to protect the lens from being damaged and from dust.

[0012] As shown in Figure 1, a concave-shaped lens cover holding part is installed on the grip part. Figure 2 is an enlarged figure of the lens cover; (131) is a locking part and (132) is a lock releasing button. The locking part (131) is so constructed that it will act in the direction of releasing the lock when the lock releasing button (132) is pressed. The lens cover (13) is attached to the lens cover holding part (15) while the lock releasing button (132) is being pressed. As shown in Figure 3, the extruding part (151) is installed on the lens cover holding part (15). The lens cover cannot be detached from the lens cover holding part (15) unless the lock releasing button (132) is pressed. When the lens cover (13) is to be detached from the lens cover holding part (15), the lock releasing button (132) is pressed to actuate the lock part (131) in the direction of releasing the lock and then the lens cover is removed from the lens cover holding part (15).

[0013] Figure 4 shows the situation where the lens cover (13) is attached to the lens cover holding part (15) during the imaging process. Since the lens cover (13) is attached to the lens cover holding part (15) without producing unevenness, the grip will not be affected adversely. Figure 5 shows the situation where the grip belt (17) is installed on the imaging device main body (11). In this figure, the grip belt (17) is installed in such a way that the projection of the grip belt (17) covers the lens cover holding part. Therefore, the concave part of the lens cover holding part (15) is not noticeable when the imaging device is not in use and the device can maintain its beautiful external appearance.

[0014] **(Embodiment of Second Implementation)** Figure 6-Figure 9 show the embodiment of second implementation of the present invention. Figure 6 is a slant view diagram of an imaging device with a lens cover attached to the front of its lens mirror cylinder while the imaging device is being carried. Figure 7 is a side view diagram of an imaging device with a lens cover attached to the front of its lens cylinder while the imaging device is being carried. Figure 8 is a slant view diagram of an imaging device with a lens cover stored in the storage part on the grip part of the imaging device main body during the imaging process. Figure 7 [sic, Figure 9 - Tr.Ed.] shows the situation where a grip belt is installed on the imaging device main body.

[0015] As can be seen from Figure 6-Figure 9, the simplified structure of the imaging device equipped with the lens cover storage mechanism of the present invention comprises the imaging device main body (21), the lens mirror cylinder (22), the lens cover (23), the grip part (24), the lens cover holding part (25), the viewfinder part (26) and the grip belt (27). A recording device is incorporated into the imaging device main body (21). As shown in Figure 6, when the imaging device is being carried, the lens cover (23) is attached to the front of the lens mirror cylinder (22) to protect the lens from being damaged and from dust.

[0016] As shown in Figure 6, a concave-shaped lens cover holding part (25) is installed on the grip part (24). As shown in Figure 7, the structure of the lens cover holding part comprises the guide rail (251), the locking part (252) and the lock releasing lever (253). When the lens cover (23) is to be

attached to the lens cover holding part (25), first of all, the guide groove (231) on the side of the lens cover (23) is set to fit the guide rail (251) of the lens cover holding part (25) and then the lens cover (23) is inserted so that it is guided by the guide rail (251). When the lens cover (23) is inserted to the very end and becomes part of the grip part (24), it is locked by the locking part (252) of the lens cover holding part (25) and the concave part (232) of the lens cover.

[0017] When the lens cover (23) is to be removed from the lens cover holding part (25), first of all the lock releasing lever (253) shown in Figure 7 is operated to move the locking part (252) in the direction of lock release and then the lens cover (23) can be removed from the lens cover holding part. As shown in Figure 8, at the time of storage of the lens cover, since the shape of the lens cover (23) matches the shape of the grip part (24), they will become a single unit and loss of grip will not occur. Moreover, as shown in Figure 9, the grip belt (27) is installed in such a way that the projection of the grip belt (27) covers the lens cover holding part (25). Therefore, the lens cover holding part (15) is not noticeable when the imaging device is being carried and the device can maintain its beautiful external appearance. This embodiment of second implementation differs from the embodiment of first implementation in that the lens cover (23) can be attached and detached from the wrist direction while holding the imaging device.

[0018] **(Embodiment of Third Implementation)** Figure 10 and Figure 11 show the embodiment of third implementation of the present invention. Figure 10 is a slant view figure showing an imaging device being carried and Figure 11 is a slant view figure showing an imaging device during the imaging process. It can be seen from Figure 10 and Figure 11 that the simplified drawing of the structure of the imaging device of the present invention with the lens cover storage mechanism comprises the imaging device main body (31), the lens mirror cylinder (32), the lens cover (33), the viewfinder (36) and a grip belt which is not shown. A recording device is incorporated inside the imaging main body (32).

[0019] As shown in Figure 10, in order to protect the lens from being damaged or from dust, the lens cover (33) is attached to the front of the lens mirror cylinder (32) while the imaging device is being carried. Also, as shown in Figure 10, the side surface of the imaging device main body (31) is flat and thus space saving is possible while the imaging device is being carried. In Figure 10, (351) is a guide rail, (352) is a locking part and (353) is a lock releasing lever. During the imaging process, first of all the lens cover (33) is removed from the lens mirror cylinder (32). The guide groove (not shown) of the lens cover (33) is allowed to be fit with the guide rail (351) and then inserted. When the lens cover (33) is inserted completely, the locking part (352) will fit into the concave part (not shown) installed on the inner side of the lens cover (33) to lock the lens cover. The front of the guide rail (351) is extruded so that the lens cover (33) cannot move beyond this point.

[0020] When the lens cover (33) is to be removed from the imaging device main body (31), first of all the lock releasing lever (353) is operated to allow the locking part (352) to move in the lock releasing direction and then the lens cover (33) is removed. This embodiment of third implementation is different from the embodiment of first implementation and the embodiment of second implementation in that the lens cover which becomes unnecessary during the imaging process is converted to the grip part.

[0021]

**[Effect of the Invention]** As explained above, in the invention in accordance with claim 1, the lens cover storage part is installed in the bulge formed on the grip part located at the side of the imaging device main body and thus effective utilization of space can be achieved. In addition, loss of the lens cover and interference by the lens cover during the imaging process can be avoided. In the invention in accordance with claim 2, attachment and detachment of the lens cover while the imaging device is being carried become easier. In the invention in accordance with claim 3, the projection of the grip belt covers the lens cover storage part so that the lens cover storage part becomes unnoticeable and the beautiful external appearance of the imaging device can be maintained.

**[Brief Description of the Figures]**

[Figure 1] A slant view figure showing the situation where an imaging device is being carried. This figure pertains to the embodiment of first implementation of the present invention.

[Figure 2] An enlarged figure of the lens cover pertaining to the embodiment of first implementation of the present invention.

[Figure 3] An A-A cross-sectional figure of the lens cover storage part pertaining to the embodiment of first implementation of the present invention.

[Figure 4] A slant view figure showing the imaging state pertaining to the embodiment of first implementation of the present invention.

[Figure 5] A slant view figure which pertains to the embodiment of first implementation of the present invention and which shows the state of installation of a grip belt while the imaging device is being carried.

[Figure 6] A slant view figure showing the state of carrying the imaging device pertaining to the embodiment of second implementation of the present invention.

[Figure 7] A side view figure showing the state of carrying the imaging device pertaining to the embodiment of second implementation of the present invention.

[Figure 8] A slant view figure showing the state of carrying the imaging device pertaining to the embodiment of second implementation of the present invention.

[Figure 9] A slant view figure which pertains to the embodiment of second implementation of the present invention and which shows the state of installation of a grip belt while the imaging device is being carried.

[Figure 10] A slant view figure showing the state of carrying the imaging device pertaining to the embodiment of third implementation of the present invention.

[Figure 11] A slant view figure showing the imaging state pertaining to the embodiment of third implementation of the present invention.

**[Explanation of Symbols]**

11, 21, 31: video camera main body  
 12, 22, 32: lens mirror cylinder  
 13, 23, 33: lens cover  
 14, 24: grip part  
 15, 25: lens cover storage part  
 16, 26, 36: viewfinder  
 17, 27: grip belt  
 131, 252, 352: locking part  
 132: releasing button  
 231: guide groove  
 232: concave part  
 251, 351: guide rail  
 253, 352: lock releasing lever

[Figure 1]

[Figure 2]

[Figure 3]  
 Section A-A

[Figure 4]

[Figure 5]

[Figure 6]

[Figure 7]

[Figure 8]

[Figure 9]

[Figure 10]

[Figure 11]